

Business Plan Summary for a Mixed C&D Debris Recycling Facility in Chittenden County

September 2005

Introduction

This document is intended to provide a basic guideline for developing a business plan for a mixed construction and demolition (C&D) debris recycling business within the Burlington, VT area. The information contained within this document is based on research performed by Green Seal Environmental, Inc. on behalf of Chittenden Solid Waste District to encourage the development of the C&D recycling infrastructure.

The following “Business Plan Summary” has been prepared to:

1. Summarize the general recycling market information obtained by Green Seal Environmental, Inc. for the development of a mixed construction and demolition debris recycling facility in the Burlington, Vermont area, and
2. Provide some of the background financial information a financier (bank, private investor, etc.) would be looking for with respect to a C&D recycling business.

The following document provides only a brief introduction to the development of a C&D recycling business within the Burlington, VT area. The developer of a facility would need to perform additional research, and then customize this document based on their individual preferences and/or constraints for developing a facility such as:

- size,
- location,
- existing site infrastructure and buildings (versus virgin developable land)
- vertical integration (hauling, processing, end product use or development),
- business model, etc.

Within this document, GSE provides “placeholder” blocks where additional customized information is required from the proponent of such a facility. The placeholder blocks give a summary of the information that should be entered by the proponent to complete the business plan. Placeholder blocks are in *italics* throughout the document.

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Definitions

Definitions The following table presents pertinent definitions that will help the reader understand acronyms and trade names that may be described within this business plan.

Term	Definition
Alternative Daily Cover (ADC)	ADC is screened and/or ground (sized) construction and demolition debris used as a daily cover material at landfills as an alternative to soil. Typically ADC consists of 3-inch minus sized material. <i>See also C&D Fines</i>
Beneficial Use Determination (BUD)	A determination from the Vermont Department of Natural Resources indicating that the “waste” has a beneficial use (e.g. daily cover)
Construction and Demolition Debris (C&D)	Means non-putrescible waste building materials and rubble, which is solid waste resulting from the construction, remodeling, repair or demolition of structures or roads.
C&D Fines	A material produced while processing C&D waste which is typically: (a) three inches or less (3" minus) in size; (b) consists of dirt (soil), wood, metal, plastic, etc., and (c) is limited to no more than 35% organic content. <i>See also ADC</i>
Clean C&D Wood	Picked C&D wood that comes from a construction and/or demolition project. Clean wood has not been chemically treated or painted and is not likely to contain contaminants. Clean wood may have a higher value due to the potential for multiple uses (e.g. land applied mulch, animal bedding, etc.).
Dirty C&D Wood	Picked or mechanically separated C&D wood that is derived from a construction, demolition, or renovation project. Dirty wood has been chemically or physically altered and is likely to contain contaminants (i.e. painted/treated wood). Dirty C&D wood has a marginal re-sale value and is found within current boiler fuel, ADC and residual materials.
C&D Residuals	C&D waste material that remains after recyclable materials (asphalt, brick, concrete, metals, etc.) and C&D Fines have been removed during processing of C&D wastes and which consists mostly of wood (clean and dirty mixed), textiles (carpet, fabric, etc.), and plastic.

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Definitions, Continued

Definitions (continued)

Term	Definition
Landfill	A facility that accepts solid waste for burial and typically does not process and/or recycle the material it accepts.
Municipal Solid Waste (MSW)	Means solid waste (no liquids or sludge) generated at residences, commercial or industrial establishments, and institutions.
Processing Facility	A solid waste handling facility where solid waste is brought, stored, and processed (usually by sorting, crushing, shredding, screening, baling, etc.) prior to transport to a solid waste disposal facility or to other types of facilities for recycling, recovery or reuse.
Transfer Facility	A handling facility that accepts, stores and transfers waste materials; however, does not mechanically process the waste material. Waste is transferred from one vehicle or container to another vehicle or container for transport off-site to a solid waste treatment, processing or disposal facility.
Tipping fee	A fee paid to a facility to recycle or discard an unwanted material.
Transportation and Disposal (T&D)	The cost to transport and dispose of a material.
Wood Waste	Waste material consisting of trees, stumps and brush, including but not limited to sawdust, chips, shavings and bark. Wood waste does not include new or used lumber or wood from construction and demolition waste and does not include wood pieces or particles containing or likely to contain asbestos, or chemical preservatives such as creosote or pentachlorophenol, or paints, stains or other coatings.
Yard and Wood Waste	Means leaves, grass clippings, garden debris, and small or chipped branches. Wood waste also will include larger branches and stumps.
White Goods	Means a generic term for a variety of discarded household appliances, including clothes washers, clothes dryers, stoves, refrigerators, freezers, dishwashers and air conditioners.

Business Overview

Business description

Based on the information provided within the market assessment for the Burlington area, a proposed C&D recycling business could be created to capture approximately 50 tons per day (TPD) of mixed construction and demolition (C&D) debris. The table presented below provides a description for a 50 tons per day facility.

Pertinent Feature	Description
Maximum Volume Per Day	50 Ton Per Day (15,000 tons annually)
Types of Waste Accepted	Mixed C&D
Recycling components	Full scale C&D recycling/processing
Operating Days	250 days per year
Operating Hours	<i>To be decided by the proponent</i>
Mode of Inbound Deliveries	Roll-off, dump bodies, pick-up, residential
Mode of Outbound Shipping	Roll-off, dump bodies, live floor trailer

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Business Overview, Continued

Site description *Once the facility location is identified, the following features should be described. If it is a developed or partially developed facility, photographs may be added as an attachment to this Business plan.*

Pertinent Feature	Description
Site size	<i>(Describe the developable area)</i>
Developed Site Area	<i>(Describe the existing site/building)</i>
Zoning	<i>(Discuss whether a variance or a special permit is needed to construct or operate the facility)</i>
Building	<i>(Discuss the size proposed, or existing if property is developed)</i>
Access Points	<i>(Discuss whether the access point(s) provides suitable ingress and egress)</i>
Utilities	<i>(Describe connections or on-site water, electricity, sewerage, etc.)</i>
Fire Protection	<i>(Describe the fire systems such as sprinkler system, fire hydrant, alarm, etc.)</i>
Unique Features	<i>(Describe positive attributes that make the facility and/or site highly desirable [e.g. major trucking route])</i>

Proposed access *Add specific details including proximity to main routes and impacts that the addition of traffic may cause on surrounding infrastructure. Impacts could include travel through residential areas, areas that have an impacted level of services [LOS], proper turning radius, and line of sight for ingress and egress.*

Abutting properties *Identify all surrounding areas to show that this site “fits” with surrounding property uses. Information could identify:*

- 1. What is the surrounding zoning (is the property centrally located within the zoned area)?*
- 2. Does the site “fit” (e.g. is it near other commercial/industrial establishments or is it adjacent to a residence)?*
- 3. Are there other large trucks and/or heavy equipment being used within the general vicinity of the site?*

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Business Overview, Continued

Permitting timelines

The table below identifies applicable major permits and the approximate timelines for review. These permits are required prior to start-up, and thus dictate the approximate timeline from project conception to start-up.

GSE omitted permits that are site-specific such as wetlands permits. The following timelines do not include estimated application preparation time. Additionally, timelines are based on sequential submittal versus simultaneous submittal of permit applications. Preparing and/or submitting permit applications simultaneously with other applications may shorten the total time it takes to obtain the permits. Given that timelines for local permits are subject to many variables that are both site-specific and specific to each municipality's authority, GSE provided conservative estimates.

Permit Name	Permit/Approval Granting Authority	Approximate Review/ Approval Timeline*
CSWD compliance with Solid Waste District Plan	CSWD	60 days
State Solid Waste Management Facility Certification (Act 78 Permit)	VT Agency of Natural Resources (ANR) administered by the Department of Environmental Conservation (DEC)	120 Days (210 days with a hearing)
Alternative Daily Cover Approval	VT ANR/DEC	90-120 days
Land Use Permit (Act 250 Permit)	VT Environmental Board (District 4 –Essex Junction)	60-80 days
Zoning/Planning	Municipality	90-180 days
Building /Occupancy	Municipality	90-180 days
Total Permitting Time = 510 - 830 days (17-28 months)		

Note: Timelines are estimated

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Business Overview, Continued

Total start up timelines

Given an estimate of 12-15 months time for project planning, preparation of permit applications, and facility construction, combined with the 17-28 months time for regulatory review of permits, the total estimated time from conception to start-up is approximately 29-43 months (approximately 2 ½ - 3 ½ years).

Based on timelines observed from for similar facilities, total project conception to operation can take as long as 3-5 years, or more. Factors which greatly affect the permitting of these facilities include: proponent's overall time commitment, proponent's industry knowledge, simultaneous versus sequential permit preparation and submittal, comprehensiveness of permit submittals, permit denials and/or appeals, etc.

Start up costs

GSE performed limited research to obtain examples of costs for the equipment needed to operate a 50 TPD mixed C&D recycling operation. Turnkey recycling equipment and mobile equipment manufacturers provided quotes, and their average prices are provided in the table below. Other start-up costs are site specific, and must be determined by the proponent. However, GSE included the following general cost categories as an example:

Description	Cost*
Recycling equipment	\$600,000
Mobile equipment, scales	\$350,000
Engineering, Permitting, and Legal	\$250,000
Site purchase and development/ alteration	\$500,000
Building, foundation, and utilities construction/alteration	\$1,000,000
Total	\$2,700,000
<i>*Costs are examples only. Actual costs need to be determined by the proponent.</i>	

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Business Overview, Continued

Operations revenues and expenses overview

After start-up, C&D recycling businesses generate revenues by charging customers to accept C&D materials. A successful C&D recycling facility recycles and/or disposes of materials at a total cost of less than the incoming tipping fee. The margin remaining, after taking into account all other expenses, is the profit margin.

Generally, C&D-derived products generate little or no net profits after additional processing, off-site transportation, and tipping fees paid to the end users of the materials. Thus, incoming material tipping fees are generally the recycler's sole revenue source, and all end products and/or residual waste materials are expenses.

A simplified example of a "net profit or loss" equation for a C&D recycling business is provided below. The proponent should calculate a "simple" summary of revenues and expenses (based on tons) and include below within the business plan. The typical profit and loss statement (not based on tons) should also be included either as an attachment, or within the document for clarity.

The example below is based on 50 tons per day of incoming material with \$96 per ton tipping fee revenues (the approximate weighted average tipping fee within the Burlington, VT area in 2003).

<i>Description</i>	<i>Revenues/Expenses*</i>
<i>Tipping fees</i>	<i>\$96.00 per ton</i>
<i>Processing costs & other general expenses</i>	<i>-\$41.00 per ton</i>
<i>Transportation & recycling/disposal costs</i>	<i>-\$40.00 per ton</i>
<i>Net Profit/(Loss)</i>	<i>\$15.00 per ton</i>
<i>* Estimated revenues and expenses will be determined by the proponent of a facility, and will be based on the specific operational and location variables of that business.</i>	

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Business Overview, Continued

Tipping fees

Tipping fees will vary based on the type of waste material brought to the facility (e.g. mixed or source separated), volume of materials provided by the customer (wholesale pricing versus retail), and existing market conditions within the geographical area (the competitions' tipping fees).

Tipping fees are set at a level to compete with the surrounding market/waste outlets. This facility will be competitive when compared to other facilities based on several factors including:

1. **Location and Distance** – *add once facility is located (explain the distance to the nearest outlets such as AllCycle Waste, Burlington Area Transfer Station, Moretown landfill)*
2. **Price** – *add once fees have been ascertained (List your proposed retail and wholesale tipping fees and compare to the competing facilities. Note that greater distances to other competing outlets will allow the facility to keep a higher tipping based on a transportation savings)*
3. **Recycling & Diversion** – *add information on benefits of recycling versus disposal based on the specific recycling and/or diversion rates of the proposed facility.*

Anticipated annual revenues

The weighted average tipping fee was \$96.48 per ton within the immediate Burlington VT area at competing facilities in 2003.

As an example, if the tipping fee were set by the proposed recycling facility at \$96.00 per ton, based on an anticipated 50 tons per day on average of incoming material, the facility would generate approximately \$4,800 per day in revenues, or approximately \$1,200,000 annually (based on 250 operating days per year).

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Business Overview, Continued

Materials recycled

The facility will produce the following products/materials:

List all products to be recycled and/or diverted by the facility. The materials listed below were derived from the “Burlington Area Market Assessment.” Other products/materials may be pursued based on the facility’s capability or desire to expand and/or create additional markets:

- C&D Screenings or “Fines”
- Mixed Wood (a combination of clean, painted, treated, and engineered)
- Aggregates (Asphalt, Brick, Concrete, etc.)
- Cardboard
- Gypsum
- Clean Wood (compost bulking agent)
- Asphalt Shingles
- Metals (ferrous & nonferrous)

End Product Percentages

The table presented below provides the average anticipated percentage, and tons of end products created at this facility.

End product percentages will vary greatly depending on the existing markets, the type of processing proposed by the facility, and other factors. The following table is based on existing markets, and “likely” markets to be developed by a new C&D recycling facility.

<i>Material</i>	<i>Percentage*</i>	<i>Tons of Material Sorted**</i>
<i>Fines</i>	<i>30%</i>	<i>15.00</i>
<i>Mixed Wood</i>	<i>12.5%</i>	<i>6.25</i>
<i>Clean Wood</i>	<i>12.5%</i>	<i>6.25</i>
<i>Aggregates</i>	<i>5%</i>	<i>2.50</i>
<i>Metals</i>	<i>5%</i>	<i>2.50</i>
<i>Gypsum</i>	<i>2%</i>	<i>1.00</i>
<i>Asphalt Shingles</i>	<i>2%</i>	<i>1.00</i>
<i>Cardboard</i>	<i>1%</i>	<i>.50</i>
<i>Residuals, Bulky Waste, Other Non-Recyclables***</i>	<i>30%</i>	<i>15.00</i>
<i>Total</i>	<i>100%</i>	<i>50.00</i>

*Percentage by weight.

**Based on assumption of 50 tons per day incoming C&D.

***A portion of the residuals may have recyclable/diversionary characteristics.

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Business Overview, Continued

Product outlets *Based on the markets identified for specific recycled materials, the proponent will provide materials to the potential outlets listed below. However, additional permits must be obtained to enable the proponent to supply materials to some of the markets listed below.*

Material	Outlets
C&D fines	Waste USA Landfill, Coventry, VT, Casella Waste Systems, Inc.
	Moretown Landfill, Moretown, VT, Waste Systems International, Inc.
Boiler Fuel	Borex, Stratton, ME, Borex, Inc.
	Borex, Livermore Falls, ME, Borex, Inc.
Clean Wood	Intervale Compost Products, Burlington, VT
	McNeil Generating Station, Burlington, VT <i>(Additional permits and demonstration of product quality required prior to shipment)</i>
Aggregate	Local Burlington area processor of aggregates (e.g. crushing plants) such as A. Marcelino & Company, Inc., South Burlington, VT
Metals	<i>Local Burlington area metal recycler.</i>
Gypsum	GP Gypsum, Newington, NH
	Compost Products, Burlington, VT <i>(Additional permits and demonstration of product quality required prior to shipment)</i>
Asphalt Shingles	No markets for asphalt shingles currently exist within the Burlington area.
Cardboard	<i>Local Burlington area cardboard recycler.</i>

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Business Overview, Continued

Transportation and disposal costs/ recycling revenues

Based on the chosen methods of processing, and products to be produced from the recycling facility, the projected costs and/or revenues from each outbound material category are listed in the table below.

A sample net cost and or revenue table is listed below. The proponent of a mixed C&D facility must consider the costs of processing (equipment and labor expenditures to produce a certain product), the costs of transportation, and any additional permitting required to produce the products listed below. Thus, the proponent must customize the information below.

Net Transportation and Disposal Costs of Outbound Materials						
Material	%	Outlet Location	Transportation Costs	Disposal Fee or Recycling Revenues	Net Cost or Revenue	Weighted Average Cost
(Per Ton)						
C&D fines	30.0%	Coventry, VT, Moretown, VT	-\$10.00	-\$10.00	-\$20.00	-\$6.00
Boiler Fuel	12.5%	Stratton, ME, Livermore Falls, ME	-\$30.00	\$8.00	-\$22.00	-\$2.75
Clean Wood	12.5%	Burlington, VT	-\$5.00	\$15.00	\$10.00	\$1.25
Aggregate	5.0%	Burlington, VT	-\$10.00	-\$5.00	-\$15.00	-\$0.75
Metals	5.0%	Burlington, VT	-\$15.00	\$50.00	\$35.00	\$1.75
Gypsum	2.0%	Newington, NH	-\$25.00	-\$25.00	-\$50.00	-\$1.00
Asphalt Shingles	2.0%	Burlington, VT	-\$10.00	-\$10.00	-\$20.00	-\$0.40
Cardboard	1.0%	Burlington, VT	-\$50.00	\$50.00	\$0.00	\$0.00
Residuals	30.0%	Coventry, VT, Moretown, VT	-\$10.00	-\$96.00	-\$106.00	-\$31.80
Total						-\$39.70

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Business Overview, Continued

Exit strategy

Four basic exit strategies can be employed for a facility such as this:

1. **Conceptualized Buyout** – Under this scenario, the concept, a suitable property (either purchased and/or under agreement) and existing engineering and consulting information is transferred to a buyer for subsequent development. Under this scenario, the return is fairly limited. On the converse, there is little development risk.
2. **Permit and Sell** – Under this scenario, the property is developed to a point where there are valid solid waste permits (e.g. city of Burlington Approval and VT State Solid Waste Management Facility Certification [Act 78 Permit]) for the proposed facility. Under this scenario, no infrastructure changes would commence (whether it is a developed or undeveloped site). Investor return is higher with this scenario, given that the solid waste permits can significantly increase the value of the property.
3. **Permit, Build, & Sell** – Under this scenario, the recycling facility would be developed to a point where it would be “turnkey”. This option typically brings a significant return on investment; however, given that there is no history of operating financial success, a lot of the perceived value may be lost.
4. **Permit, Build, Develop to Capacity, and Sell** – Based on past precedent with solid waste management and recycling facility sales, this typically provides the largest return on investment. However, there is significant risk associated with purchases of property, infrastructure development, and other associated development/permitting costs. Once a waste facility can show that they are profitable, it brings significant value and position for a sale.

The proponent should describe which of the exit strategies they will likely employ, and their reasons for doing so.

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Marketing Approach

Introduction The following sections provide a summary of the marketing approach that will be employed to secure incoming waste materials and markets for outgoing products.

Face to face meetings Key personnel (i.e. principals) and sales staff will secure inbound materials and outlets through the following face-to-face meetings and activities:

- Meetings with town solid waste boards and/or DPW Directors
 - Meetings with counties
 - Meetings with local and regional haulers
 - Meetings with existing/potential clientele including landfills and strategically related recycling facilities
 - Bidding on contracts (existing and future RFP's) within the region
 - Joining trade associations (e.g. Construction Materials Recycling Association)
 - Becoming involved with local and regional solid waste related groups
-

Advertising The facility will maintain an advertising presence as deemed necessary through the following communications and advertising vehicles:

- Trade journals
 - Trade shows
 - Newspaper(s)
 - Internet
 - Local sponsorships
 - Directory(s)
-

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Marketing Approach, Continued

Location & convenience factors

The facility will capitalize on the following location and convenience factors:

The list below is provided as a sample of location and convenience factors:

- *Location relative to the generation of the waste*
- *Easy access to the interstate system*
- *Fast tipping (multiple bays)*
- *Less risk of flat tires (facility will be cleaned and swept daily)*
- *Drop off center (e.g. allowing clients to drop roll-offs and the facility will tip them. The facility may also allow haulers to stage empty containers/trailers on-site).*

Note: The following are examples and location and convenience factors may change depending upon the ultimate location of the facility.

Tipping fee

The facility will capitalize on the following with respect to tipping fees:

The following is a sample of potential tipping fee incentives:

- *Long term contracts will be accepted and/or negotiated*
 - *Variable rate tipping fees based on quality/recyclability of the material being delivered*
 - *Tipping fee credit can be established for commercial accounts*
 - *Tipping fees will be competitive to ensure that the facility can capture the necessary market share*
-

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Marketing Approach, Continued

Recycling

The facility will capitalize on its recycling capabilities, which may provide value and appeal to many individuals, corporations and municipalities. The facility will:

- Promote recycling and diversion from the surrounding landfills
- Comply state and local recycling goals
- Provide for credits to clients for recycling (i.e. LEEDS)
- Assist with the waste reduction goals of Chittenden Solid Waste District

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Competition Identification

Introduction The following section should identify the facilities that may present competition to the proposed facility.

Competition C&D The following facilities have been identified as competition to the proposed C&D facility. Individual site-specific information is presented in the proceeding sections

1. AllCycle Waste, Inc., Casella Waste Systems, Inc. (CWS), Williston, VT
2. Burlington Area Transfer Station, CSWD owned/ Waste Systems International, Inc. (WSI)-operated, Williston, VT

Facility #1 AllCycle Waste, Inc., The table presented below outlines specific information with respect to this competitor.

Topic	Information	Description
Facility Address	25 Avenue B, Williston, VT	Approximately 2 miles from Interstate 89, just off of Route 2 on the west side of Williston.
Distance to Proposed Facility	<i>Not applicable until site is designated</i>	<i>Not applicable until site is designated</i>
Material(s) Accepted	Mixed C&D	Accepts demolition, renovation and construction debris.
Tonnage/Capacity	22,868 tons per year	Accepted 22,868 tons in 2003, approximately 91 TPD on average
Recycling/Disposal Markets	Disposal	Hauls to Waste USA Landfill, CWS, Coventry, VT, and other disposal sites.
Service Area	Burlington and vicinity	Burlington and vicinity
<p>Notes: The proposed facility will compete with AllCycle Waste, Inc. in the following areas: <i>(Describe the proposed competitive advantages, if any, for the following)</i></p> <ol style="list-style-type: none"> 1. <i>Location</i> 2. <i>Price</i> 3. <i>Recycling components</i> 4. <i>Ease of access</i> 		

Continued on next page

Competition Identification, Continued

**Facility #2
Burlington
Area Transfer
Station**

The table presented below outlines specific information with respect to this competitor

Topic	Information	Description
Facility Address	Redmond Road, Williston, VT	Approximately 3.5 miles from Interstate 89 on the central/west side of Williston (further away from Burlington than AllCycle).
Distance to Proposed Facility	<i>Not applicable until site is designated</i>	<i>Not applicable until site is designated</i>
Material(s) Accepted	Mixed C&D	Accepts demolition, renovation and construction debris.
Tonnage/Capacity	18,245 tons per year	Accepted 18,245 tons in 2003, approximately 73 tons per day average.
Recycling/Disposal Markets	Disposal	Hauls to Moretown Landfill, WSI, Moretown, VT for disposal.
Service Area	Burlington and vicinity	Burlington and vicinity
<p>Notes: Proposed facility will compete with Burlington Area Transfer Station in the following areas: <i>(Describe the proposed competitive advantages, if any, for the following)</i></p> <ol style="list-style-type: none"> 1. <i>Location</i> 2. <i>Price</i> 3. <i>Recycling components</i> 4. <i>Ease of access</i> 		

Personnel Overview

Introduction The following section provides a brief overview of the personnel required to manage the on-site operations.

On-site staffing needs The table below summarizes the job descriptions and likely salaries of the personnel.

Please note, that given the relatively small size of the proposed facility (50 tons per day), several of the job descriptions provided below will likely be incorporated into one employee’s job model. Thus, the total of the salaries in the table below does not represent the total salaries for the staff. Adjustments need to be made based on the proponents desired staffing.

Title and Number of Employees	Job Description	Annual Salary or Hourly Range
General Manager (1)	This individual will be responsible for: <ul style="list-style-type: none"> ➤ Entire facility ➤ Profitability/Sales ➤ Pricing ➤ Transportation ➤ Environmental ➤ Reporting 	\$65K
Operations Manager (1)	This individual will be responsible for: <ul style="list-style-type: none"> ➤ All facility operation aspects ➤ Throughput ➤ Transportation ➤ Environmental compliance ➤ All operations personnel ➤ Operational reporting <p><i>Note that the operations manager should be proficient in operating all equipment and machinery on-site</i></p>	\$45K

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Personnel Overview, Continued

On-site staffing needs (continued)

Title and Number of Employees	Job Description	Annual Salary or Hourly Range
Equipment operators (1)	<p>This individual will be responsible for operating on-site fixed and mobile equipment including:</p> <ul style="list-style-type: none"> ➤ Loader ➤ Excavator ➤ Processing line ➤ Yard horse (truck) <p><i>Note that this operator should have mechanical and welding skills to reduce the reliance on outsourcing.</i></p>	\$35K
Scale Attendant (1)	<p>This individual will be responsible for:</p> <ul style="list-style-type: none"> ➤ Tarring of inbound and outbound vehicles ➤ Traffic flow ➤ Coordination between transporting vehicles and operational staff ➤ Load rejection ➤ All reporting associated with inbound and outbound logistics 	\$35K
Administrators (1)	<p>These individuals will be responsible for:</p> <ul style="list-style-type: none"> ➤ AR/AP ➤ Credit ➤ All daily accounting functions ➤ All administrative functions <p><i>Given the size of the facility, the Administrator could also function as the scale attendant to reduce overhead costs</i></p>	\$35K

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Personnel Overview, Continued

On-site staffing needs (continued)

Title and Number of Employees	Job Description	Annual Salary or Hourly Range
Pickers (2)	These individuals will be responsible for: <ul style="list-style-type: none"> ➤ Picking recyclables from the processing line ➤ Load inspections ➤ General upkeep and tasks necessary for maintaining a compliant facility 	\$22K
Mechanic/Welder (1)	This individual will be responsible for all required mechanical maintenance to the fixed and mobile equipment <i>Note that this position may not be necessary given the qualifications of the Operations Manager and/or Equipment Operator</i>	\$30K
*All salaries are estimated, and must be determined by the proponent to complete the business plan.		

Total annual payroll

Given the relatively small size of the proposed operation, it will likely be necessary for employees to cover the responsibilities of several of the job categories listed above. Based on the employment of the one General Manager, one Operations Manager/Equipment Operator, one Equipment Operator, one Administrative/Scale Attendant, and two General Laborers, the monthly payroll would be approximately \$18,000 per month.

As noted above, adjustments need to be made based on the proponent's desired staffing plan.

Insurance

Introduction The following section briefly identifies the insurance that a facility such as this will maintain.

Insurance coverage(s) The table presented below provides limited information about insurance that will be carried by the proposed facility.

Type of Insurance	Description	Estimated Coverage Amount
Commercial General Liability	Covers the liabilities/claims associated with the facility's day-to-day operations.	<i>Fill in estimated amount</i>
Loss of Use	Will compensate facility if the facility has to shut down (e.g. fire).	<i>Fill in estimated amount</i>
Property	Covers fixed property at the facility including the structure.	<i>Fill in estimated amount</i>
Motor Vehicle	Provides for liability, property damage and loss of registered/insured vehicles.	<i>Fill in estimated amount</i>
Workers Compensation	Covers claims/liabilities associated with on-site hired personnel.	<i>Fill in estimated amount</i>
Closure	Covers the costs associated with planned and/or unplanned closure of the facility (<i>VT DNR requirement-separate from loss of use listed above</i>)	<i>Fill in estimated amount</i>

Financial Data

Introduction

The following section provides general information on proposed financials. This section will focus on the following areas:

- General Financial Overview
 - Loan applications
 - Capital equipment and supply list
 - Pro-forma financial projections:
 - Breakeven Analysis
 - Profit & Loss
 - Balance sheet
 - Cash Flow
-

General financial overview

This section should provide information relative to the applicant's solid waste and/or general business related experience. Information could include:

- *Profile of the proponent's existing or previously owned business(es)*
 - *Success, profitability, and milestone markers of business(s) owned or previously owned*
 - *Experience in the solid waste field*
 - *Amount of solid waste currently handled*
 - *Other generalized information deemed applicable*
-

Loan Applications

This section should identify the following once a site and the amount of private investment or "non-loan" capital has been ascertained. This section should address the following:

- *Loan Applications (individual, corporation, trust, etc.)*
 - *Amount of the loan(s) requested*
 - *Credit history as deemed applicable*
 - *Proposed durations of the loan(s)*
 - *Qualifying programs (SBA, SEED, etc.)*
-

Continued on next page

Financial Data, Continued

Infrastructure, capital equipment & supply list

The table presented below provides the reader with a general overview of the cost for the infrastructure, capital equipment (fixed and mobile), and general supplies that will be necessary for the start-up of the proposed facility. Further detailed information can be found in the proceeding sections.

Item	Description	Cost
<i>Recycling building</i>	<i>Pre-fabricated metal shell building with concrete foundation, fire control system, dust control system, electricity, plumbing</i>	<i>\$1,000,000</i>
<i>Site development</i>	<i>Paving, stormwater controls, utilities, etc.</i>	<i>\$500,000</i>
<i>Mobile equipment</i>	<i>1 Excavator, 1 Front-loader</i>	<i>\$250,000</i>
<i>Recycling equipment</i>	<i>1 Turnkey C&D Recycling system</i>	<i>\$600,000</i>
<i>Scale</i>	<i>1 multi-use inbound/outbound scale</i>	<i>\$100,000</i>
<i>Office infrastructure</i>	<i>Computers, office furnishings and equipment, software</i>	<i>\$25,000</i>
<i>Operating supplies inventory</i>	<i>Processing equipment supplies, wear parts</i>	<i>\$25,000</i>
Total		\$2,500,000

Pro-forma financials

Pro-forma financial projections are provided for the following:

- Breakeven Analysis
- Pro-forma Profit & Loss
- Pro-forma Balance Sheet
- Pro-forma Cash Flow

The financial statements below should be customized for the specific business being developed by the proponent. These statements are typically prepared by, or with the assistance of, a business accountant or other qualified financial professional. Sample statements have been included below.

Continued on next page

Financial Data, Continued

Break-even analysis

This segment of the pro-forma is a projection of the quantity of sales (in units) required to “break-even” on a monthly basis. The table below displays this simplified example. The business projects to break-even on a monthly basis with approximately 40 tons entering the facility, providing tipping fee revenues of \$3,840 per day at \$96 per ton. At this operating level, the monthly revenues generated, approximately \$85,000, will cover the estimated monthly expenses of the facility.

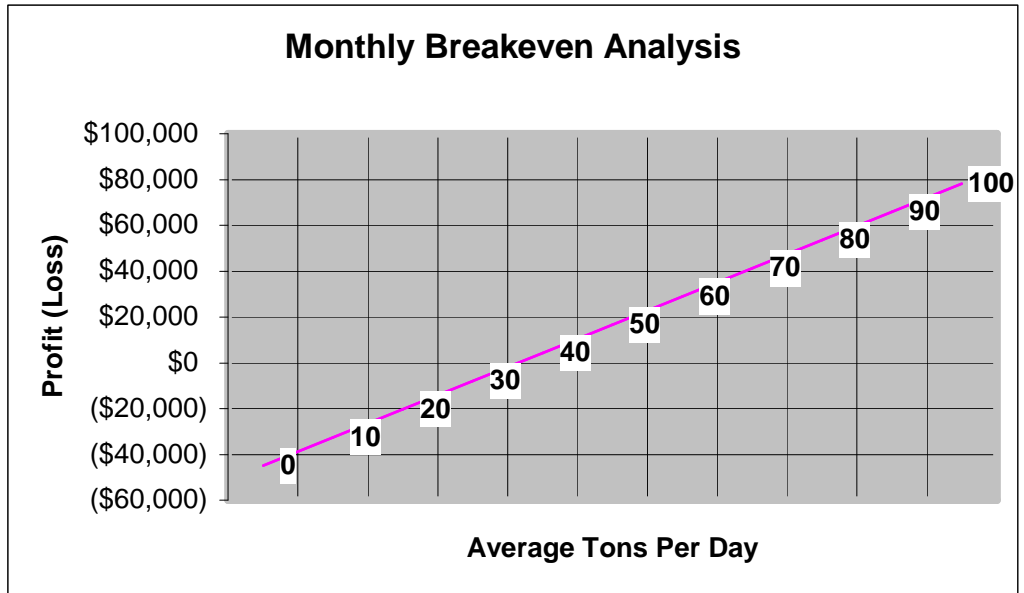
The breakeven analysis makes the following assumptions:

- *A debt payment of \$25,000 per month based on a 10-year, \$2,000,000 loan, at 9% interest*
- *\$20,000 per month payroll, operating, and other miscellaneous expenses*
- *A net \$40.00 per ton weighted average cost of diversion/disposal for all outbound materials.*

Monthly Breakeven Analysis						
<i>Tons per day</i>	<i>Tons per month</i>	<i>Tipping Fee</i>	<i>Tipping Fee Revenues</i>	<i>Fixed Expenses</i>	<i>Disposal/ Recycling</i>	<i>Profit/Loss</i>
0	0	\$96	\$0	\$45,000	\$0	(\$45,000)
10	220	\$96	\$21,120	\$45,000	\$8,800	(\$32,680)
20	440	\$96	\$42,240	\$45,000	\$17,600	(\$20,360)
30	660	\$96	\$63,360	\$45,000	\$26,400	(\$8,040)
40	880	\$96	\$84,480	\$45,000	\$35,200	\$4,280
50	1100	\$96	\$105,600	\$45,000	\$44,000	\$16,600
60	1320	\$96	\$126,720	\$45,000	\$52,800	\$28,920
70	1540	\$96	\$147,840	\$45,000	\$61,600	\$41,240
80	1760	\$96	\$168,960	\$45,000	\$70,400	\$53,560
90	1980	\$96	\$190,080	\$45,000	\$79,200	\$65,880
100	2200	\$96	\$211,200	\$45,000	\$88,000	\$78,200

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Financial Data, Continued



Continued on next page

Financial Data, Continued

Pro-forma profit and loss

As shown in the profit and loss statement below, the company anticipates essentially breaking even during the first fiscal year, and producing a net profit of approximately \$67,000 by the third fiscal year.

The table below provides a sample profit and loss statement. The proponent must customize their projections based on the specifics of their business model.

Sample Pro Forma Profit and Loss			
	FY 2005	FY 2006	FY 2007
Sales	\$1,200,000	\$1,300,000	\$1,400,000
Direct Cost of Sales	\$120,000	\$120,000	\$120,000
Other	\$0	\$0	\$0
Total Cost of Sales	\$120,000	\$120,000	\$120,000
Gross Margin	\$1,080,000	\$1,180,000	\$1,280,000
Gross Margin %	90.00%	90.77%	91.43%
Expenses:			
Payroll	\$225,000	\$240,000	\$255,000
Disposal/Recycling Fees	\$500,000	\$525,000	\$550,000
Sales and Marketing and Other Expenses	\$5,000	\$5,000	\$5,000
Depreciation	\$100,000	\$100,000	\$100,000
Telephone/Fax	\$7,500	\$7,500	\$7,500
Utilities	\$25,000	\$25,000	\$25,000
Payroll Taxes	\$11,250	\$12,000	\$12,750
Other	\$0	\$0	\$0
Total Operating Expenses	\$873,750	\$914,500	\$955,250
Profit Before Interest and Taxes	\$206,250	\$265,500	\$324,750
Interest Expense	\$180,000	\$180,000	\$180,000
Taxes Incurred	\$49,500	\$63,720	\$77,940
Net Profit	(\$23,250)	\$21,780	\$66,810
Net Profit/Sales	-1.94%	1.68%	4.77%

Continued on next page

Financial Data, Continued

Pro-forma balance sheet

The table below presents the pro-forma balance sheet for fiscal years 2005-2007.

The proponent must customize their projections based on the specifics of their business model.

Sample Pro Forma Balance Sheet			
Assets			
Current Assets	FY 2005	FY 2006	FY 2007
Cash	\$50,000	\$75,000	\$80,000
Accounts Receivable	\$75,000	\$100,000	\$125,000
Other Current Assets	\$0	\$0	\$0
Total Current Assets	\$125,000	\$175,000	\$205,000
Long-term Assets			
Long-term Assets	\$3,000,000	\$3,250,000	\$3,500,000
Accumulated Depreciation	\$150,000	\$200,000	\$250,000
Total Long-term Assets	\$2,850,000	\$3,050,000	\$3,250,000
Total Assets	\$2,975,000	\$3,225,000	\$3,455,000
Liabilities and Capital			
Current Liabilities	FY 2005	FY 2006	FY 2007
Accounts Payable	\$45,000	\$50,000	\$55,000
Current Borrowing	\$25,000	\$25,000	\$25,000
Other Current Liabilities	\$0	\$0	\$0
Subtotal Current Liabilities	\$70,000	\$75,000	\$80,000
Long-term Liabilities			
Long-term Liabilities	\$2,000,000	\$2,000,000	\$2,000,000
Total Liabilities	\$2,070,000	\$2,075,000	\$2,080,000
Capital			
Paid-in Capital	\$150,000	\$100,000	\$50,000
Retained Earnings	\$25,000	\$44,700	\$89,860
Earnings	\$19,700	\$45,160	\$70,620
Total Capital	\$194,700	\$189,860	\$210,480
Total Liabilities and Capital	\$2,264,700	\$2,264,860	\$2,290,480
Net Worth			
Net Worth	\$710,300	\$960,140	\$1,164,520

Continued on next page

Financial Data, Continued

Pro-forma cash flow

The table below presents the projected cash flow for fiscal years 2005-2007. Based on the estimations, projected cash flow is anticipated to be adequate for meeting expenses for the following three fiscal years.

The proponent must customize their projections based on the specifics of their business model.

Sample Pro Forma Cash Flow			
	FY 2005	FY 2006	FY 2007
Cash Received			
Cash from Operations:			
Cash Sales	\$1,000,000	\$1,200,000	\$1,300,000
Cash from Receivables	\$25,000	\$75,000	\$100,000
Subtotal Cash from Operations	\$1,025,000	\$1,275,000	\$1,400,000
Additional Cash Received			
Sales Tax	\$0	\$0	\$0
New Current Borrowing	\$0	\$0	\$0
New Other Liabilities (interest-free)	\$0	\$0	\$0
New Long-term Liabilities	\$0	\$0	\$0
Sales of Other Current Assets	\$0	\$0	\$0
Sales of Long-term Assets	\$0	\$0	\$0
New Investment Received	\$50,000	\$0	\$0
Subtotal Cash Received	\$1,075,000	\$1,275,000	\$1,400,000
Expenditures			
Expenditures from Operations:			
Cash Spending	\$25,000	\$8,000	\$9,000
Payment of Accounts Payable	\$900,000	\$950,000	\$1,050,000
Subtotal Spent on Operations	\$925,000	\$958,000	\$1,059,000
Additional Cash Spent			
Sales Tax	\$0	\$0	\$0
Principal Repayment of Current Borrowing	\$2,500	\$5,000	\$7,500
Other Liabilities Principal Repayment	\$0	\$0	\$0
Long-term Liabilities Principal Repayment	\$120,000	\$120,000	\$120,000
Purchase Other Current Assets	\$0	\$0	\$0
Purchase Long-term Assets	\$0	\$0	\$75,000
Dividends	\$0	\$0	\$0
Subtotal Cash Spent	\$1,047,500	\$1,083,000	\$1,261,500
Net Cash Flow			
Net Cash Flow	\$27,500	\$192,000	\$138,500
Cash Balance			
Cash Balance	\$27,500	\$219,500	\$358,000

Attachments

Attachments

The following attachments should be prepared by the proponent and included as attachments to the business plan (if applicable):

- *Tax Returns - for all principals*
 - *Personal Financial Statements*
 - *Purchase and Sales Agreement*
 - *Licenses and/or Supporting Documentation (VT DNR Permits, etc.)*
 - *Resumes of Principals*
 - *Waste Contract/Commitments (inbound and outbound materials)*
-

Equipment Selection Research

Introduction

This document has been prepared by Green Seal Environmental, Inc. (GSE) for Chittenden Solid Waste District (CSWD) to provide preliminary information on equipment specifications for a mixed construction and demolition debris (C&D) recycling facility in the Burlington, VT area. This research was performed to provide approximate costs and basic information pertaining to a turnkey mixed C&D recycling system and associated mobile equipment for a 50 tons per day recycling operation.

Additional research

This equipment research document is for preliminary informational purposes only, and does not represent an endorsement or recommendation of specific equipment brands or methods of processing. Prior to the development of a C&D recycling facility, GSE recommends that a proponent perform additional research to ensure that the chosen processing system meets their current and future needs. For example, variables which should be considered include: existing end markets for materials, ability to produce variable end products, budget, building size, lot size, system expandability, equipment mobility, interchangeability, ability to handle different waste streams, etc. These variables are often site specific, and/or determined by the particular business model for a facility.

Continued on next page

Equipment Selection Research, Continued

Equipment options

A large number of C&D processing equipment types, configurations, and options are available. Additionally, while certain companies supply turnkey systems, others supply only pieces of a mixed C&D recycling “line.” GSE obtained quotes by directly contacting industry-leading suppliers of turnkey C&D recycling systems only. This was done in the interest of providing an estimated cost for the procurement of a “complete” C&D recycling system, and did not involve exhaustive research of all possible system configurations and options.

Request for information

Prior to performing equipment research, GSE performed a market assessment for the development of a mixed C&D recycling facility within the Burlington VT area. The market information obtained from this research was used to determine the approximate size of a potential C&D recycling facility (tons per day), the potential end markets for recycled materials, and the general types of processing and handling equipment that may be needed. This general information was provided to major suppliers of “turnkey” mixed C&D recycling systems, along with a specific request for detailed information on their systems. GSE requested the following information:

- Provide a quote for the purchase and delivery of a turnkey C&D recycling system with the following capabilities:
 - Process an average of 50-75 tons per day, with capability of processing up to 150 tons per day
 - Screen ½”-1”-minus fines from the incoming mixed C&D debris
 - Provide a raised picking station for at least 8 persons (8 material chutes, 4 on each side)
 - Magnetically separate ferrous metal (crossbelt, head pulley, etc.)
 - Grind hand-sorted wood (either connected or separated grinding system). Must have ability to change screen sizes from ½” to 3”-minus.
 - Screen post-ground material to approximately ½”-minus material. Provide additional magnetic ferrous separation on the stacking conveyor post-screening (crossbelt, head pulley, etc.)
 - Provide quotes for both electrical and diesel-powered processing lines
 - Provide detailed information on the amount of time required for delivery and installation upon signing of the purchase and sale agreement
-

Continued on next page

Equipment Selection Research, Continued

Request for information
(continued)

- Provide estimated set-up/installation costs for the mixed C&D system
 - Provide the names and contact information of at least two reference sites with similar turnkey systems in operation for at least one year
 - Provide estimated costs per year for operating the equipment (electricity, fuel requirements)
 - Provide information on electric service needs for system and pre-installation mechanical requirements (electrical hook-ups, concrete base structures, etc.)
 - Provide estimated cost per year for maintenance costs including but not limited to such items as:
 - Grinder maintenance (Wear parts, screens, etc.)
 - Screener repairs (repair of screens, punch plates, motors, etc.)
 - Conveyor belt repairs (Splicing, replacing, etc.)
 - Provide detailed information on parts and/or labor warranties
 - Provide typical amortization schedule for the system
-

Processing line information received

Of the fourteen (14) companies contacted, GSE received three (3) responses. The suppliers who responded were: Continental Biomass Industries (CBI), Erin Systems, and Vermeer Northeast/MCB Northeast. Copies of their full proposals were forwarded to Chittenden Solid Waste District.

Below is a summary of the information received:

- According to the quotes supplied, the prices for the turnkey systems ranged from \$588,862 to \$931,400, with an average price of \$733,679.
 - The systems configurations varied considerably, and included contiguous lines as well as processing lines with separate sorting and grinding portions.
-

Continued on next page

Equipment Selection Research, Continued

Mobile equipment options

Based on the operations at similar small-scale mixed C&D processing facilities, the mobile equipment typically utilized in this type of operation includes:

- Excavator – Used for pre-sorting (kick-sorting) large items from incoming materials, tracking (or crushing) materials prior to entering the processing line, loading incoming materials into the processing line, and loading processed materials (such as metals) into containers for shipment to markets.
- Wheel loader – Used for moving incoming loads of material to the processing line in-feed area, loading recyclables and non-recyclables into containers for shipment to markets, and for “clearing” materials from below the picking station sorting chutes.
- Skid steer loader – Used for moving incoming loads of material to the processing line in-feed area, loading recyclables and non-recyclables into containers for shipment to markets, and for “clearing” materials from below the picking station sorting chutes.

Given the relatively small-scale operation (approximately 50 tons per day), an excavator and a wheel loader would likely suffice for managing the incoming and processed materials. However, depending on the rate at which materials are loaded, and the number of operational hours per day, a skid steer loader may be considered to increase throughput.

Continued on next page

Equipment Selection Research, Continued

Mobile equipment costs GSE obtained verbal quotes from four (4) manufacturers/suppliers of mobile heavy equipment. Below is a summary of information obtained:

- Small to mid-sized excavators ranged in prices from \$122,000 to \$125,000, with an average price of \$123,500.
 - Small to mid-sized wheel loaders ranged in price from \$93,000 to \$124,000 with an average price of \$108,000.
 - The average cost of an excavator and a loader equals \$231,500.
-

Summary The following is a summary of the potential costs of processing and mobile equipment for a 50 tons per day mixed C&D recycling operation:

- Of the system suppliers who provided price quotes, the average turnkey C&D recycling systems was approximately \$734,000.
 - Of the mobile equipment suppliers who provided price quotes, the average cost for both a front loader and an excavator was \$232,000.
 - Using the average cost of the turnkey mixed C&D recycling systems and the average cost of the mobile equipment needed to manage the materials, the total cost equals \$966,000.
-

Burlington Area C&D Market Assessment

Overview

Introduction

This Burlington Area C&D Market Assessment was performed by Green Seal Environmental, Inc., (GSE) of Sandwich, Massachusetts, with partial funding from Chittenden Solid Waste District (CSWD), Williston, VT. The purpose of the assessment is to assist in the future development of a mixed construction and demolition (C&D) recycling facility in the Burlington, VT area. The Assessment includes four parts:

- Generation Assessment
 - Regional Tipping Fees Assessment
 - End Markets Assessment
 - Conclusions and Recommendations
-

Contents

This publication contains the following topics:

Topic	See Page
Generation Assessment	2
Regional Tipping Fees Assessment	5
End Market Assessment	6
Fines	11
Mixed Wood	15
Clean Wood	17
Aggregates	19
Gypsum	20
Asphalt Shingles	23
Conclusions and Recommendations	25

Generation Assessment

Introduction

GSE performed research to determine the approximate amount of C&D generated in the Burlington, VT area. The purpose of estimating generation is to determine an approximation of the amount of C&D that would theoretically be available for recycling if a mixed C&D facility were to open somewhere within the region. However, the amount of C&D material that could actually be obtained by a new C&D recycling business would be subject to many variables including price, location, service, transportation, local and regional competition, etc. Thus, generation does not reflect the actual “available supply” of C&D, but for the purpose of the study will be used as a baseline for assumptions made within the remaining text of the document.

Generation Estimate Methodology

The quantity of C&D generated within a region can be estimated using several methods. Generation can be estimated by using a pre-determined “per capita” C&D generation rate, and multiplying this per capita rate by the total population within a given region. Alternatively, generation can be estimated from data provided by local or regional waste facilities (landfills, transfer stations, recycling facilities, etc.). The per capita method is typically less accurate, and is generally used when actual generation numbers from reporting facilities is not available.

CSWD continuously monitors and maintains accurate records of the quantity of C&D “handled” from within the Burlington, VT area. This record keeping is a function of CSWD’s funding source, which is derived from ordinance fees on landfilled waste (currently \$17.61/ton) that originates within the Solid Waste District. Thus, for the purpose of this study, CSWD’s generation figures will be used as one of the baseline figures for the development of a mixed C&D recycling facility.

Given the quality of the data available from CSWD, GSE assumes the figures are a reasonable conservative approximation of the amount of C&D generated within the region. Even if a small portion of the C&D generated were missing from CSWD records (due to direct hauling out of the region, illegal disposal, etc.), that material would likely not be theoretically available for a new C&D recycling facility.

Continued on next page

Generation Assessment, Continued

**Generation
Estimate
Formula**

GSE estimated the generation as follows:

2003 Generation =

Incoming C&D at Burlington-Area Transfer Stations

+

Direct-Hauled Incoming C&D at Burlington-Area Landfills

**Generation
Estimate
Summary**

GSE obtained 2003 facility data from CSWD, which was extracted from facility reports from two area landfills and two area transfer stations. These facilities were assumed to handle a majority of the C&D generated within the region. Based on these reports, generation of C&D in the Burlington area is estimated to be as follows:

- Approximately 41,639 tons per year, or approximately 167 tons per day was handled by transfer stations and landfills in the Burlington-area in 2003. For the purpose of this assessment, GSE will assume that the same amount of C&D will be generated in 2004.
- A majority of the total C&D handled (99%, or 164 tons per day) is handled by two local transfer stations. Very little debris is direct-hauled from the Burlington area to the two closest in-state landfills (Coventry and Moretown, VT).
- If a new C&D recycling facility were to offer significant incentives (disposal price, transportation price, ease of use, recycling promotion, proximity to central generation points, etc.) in an effort obtain a 30% market share of the 167 tons per day handled in the Burlington, VT area, it would equate to approximately 50 tons per day. GSE will use this assumption for comparisons to end-market capacity of post-processed materials.

Continued on next page

Generation Assessment, Continued

Transfer Stations

The table below summarizes the tonnage of C&D handled by transfer stations within proximity of Burlington, VT.

Facility Name, Owner, Location	2003 Annual Tons of C&D Accepted	2003 Tons of C&D Accepted Per Day*
AllCyle Waste, Inc., Casella Waste Systems, Inc. (CWS), Burlington, VT.	22,868	91
Burlington Area Transfer Station, CSWD owned/ Waste Systems International, Inc. (WSI)-operated, Williston, VT	18,245	73
Total Tons	41,113	164

*Assumes 5 days per week operation, open 50 weeks per year.

Landfills

The table below summarizes the tonnage of C&D handled by in-state landfills within proximity of Burlington, VT. According to CSWD data, very little C&D is direct hauled to these landfills due to the distance to the landfills versus the centrally located transfer stations.

Facility Name, Owner, Location	2003 Tons of C&D Direct-hauled to Landfills from the Burlington Area	2003 Tons of C&D Direct-hauled to Landfills from the Burlington Area per day*
Waste USA Landfill, CWS, Coventry, VT	0	0
Moretown Landfill, WSI, Moretown, VT	526	2
Total Tons	526	2

*Assumes 5 days per week operation, open 50 weeks per year.

Other Regional Facilities

A landfill in Morrisonville, NY, the Clinton County Regional Landfill, is also a potential outlet for C&D generated within the Burlington, VT region. However, given its distance from the region, it is unlikely that a large quantity of C&D is direct-hauled from within the region and disposed at this facility.

Regional Tipping Fees Assessment

Introduction

GSE obtained the “gate rate” tipping fees currently being charged at the facilities handling the majority of the C&D generated in the Burlington area. Tipping fees from private facilities always have the potential to change, and competition from the development of a mixed C&D recycling facility will impact and possibly reduce tipping fees in the region. Therefore, current tipping fees do not accurately reflect the tipping fees that could be charged by a new mixed C&D recycling facility in the Burlington area in the future. Additionally, performing exhaustive research to determine the anticipated tipping fees was not part of the scope of the research performed by GSE.

Regional Facilities and Tipping Fees

Research was conducted, including reviewing existing CSWD reports, telephone interviews, and on-site meetings. The table below presents the current disposition of a majority of the C&D debris generated in the greater Burlington, VT area and their current “gate rate” tipping fees for C&D. C&D is primarily handled by 3 facilities, with a weighted average tipping fee of \$96.48 per ton.

Facility Name, Owner, Location	Facility Type	Per Ton Tipping Fee*
AllCyle Waste, Inc., Casella Waste Systems, Inc. (CWS), Burlington, VT	TS	\$95.75
Burlington Area Transfer Station, CSWD owned/ Waste Systems International, Inc. (WSI)-operated, Williston, VT	TS	\$97.50
Moretown Landfill, WSI, Moretown, VT	LF	\$92.61

*Includes CSWD’s \$17.61 per ton tax on disposal, VT ANR’s \$6.00 per ton tax on disposal, VT ANR’s \$0.75 per ton permit fee tax, and any host community fees (taxes) negotiated with the respective host communities.

TS = Transfer Station

LF = Landfill

Estimating future tipping fee revenues

To be conservative, GSE recommends a reduction in tipping fees by 25 percent if a facility were to attempt to obtain 30 percent (50 tons) of the total C&D generated per day (164 tons). With a 25 percent reduction in tipping fees, the price would be approximately \$72.00 per ton. A facility accepting an average of 50 tons per day at \$72.00 per ton would generate approximately \$3,600 in tipping fee revenues daily.

End Markets Assessment

Introduction

The following section provides an overview of end-markets for C&D. End-markets for metals and cardboard were not included in the report given the obvious, highly established existing markets for these materials. The following markets were analyzed:

- C&D Screenings or “Fines”
 - Mixed Wood (a combination of clean, painted, treated, and engineered)
 - Aggregates (Asphalt, Brick, Concrete, etc.)
 - Gypsum
 - Clean Wood
 - Asphalt Shingles
-

Existing versus developed markets

Currently, no mixed C&D recycling facilities exist within the Burlington, VT area. Thus, aside from metals and cardboard, a majority of the markets from mixed C&D derived materials are not “pre-existing” markets, and will need to be “created” for a new mixed C&D recycling facility. However, some source-separated material demonstration projects and/or existing recycling operations do exist (or have existed) within the region such as with gypsum and asphalt shingles.

The research performed in this study was to obtain information on the general potential markets for those materials listed above, and major issues to overcome in developing the markets. However, prior to the development of a mixed C&D recycling facility, specific processes and quality control measures will need to be determined by that specific recycling facility, which coincides with the exact specifications of the outlets.

Continued on next page

End Markets Assessment, Continued

Regulations

The approved use of recycled or diverted C&D-derived products at a new C&D recycling facility may require permits or approvals from federal, state, regional, or local agencies or authorities. Within the industry, the recycling or diversion of products is typically referred to as “beneficial use.” Based on similar permitting of facilities in other states, permits and compliance for beneficial use of C&D-derived materials may include:

- Initial and/or ongoing demonstration of the products ability to perform compared to virgin products performance specifications For example, determining how asphalt pavement containing recycled asphalt shingle materials performs as compared to virgin asphalt pavement.
- Initial and/or ongoing physical and/or chemical laboratory analysis. For example, sampling C&D-derived “fines” product screened from mixed C&D for heavy metals such as lead to determine whether the material is contaminated or may need more restrictive usages.
- Initial and/or ongoing physical analysis. For example, sampling C&D-derived “fines” product screened from mixed C&D for organic content (such as wood) to determine whether the material is suitable for landfill daily cover without causing a fire hazard.
- Written “beneficial use” permit applications to provide regulatory agencies with background information on the proposed facility’s waste screening and acceptance protocols, processing/separation equipment used, and/or storage and handling methods.
- Ongoing inspections and reporting to determine the consistency of materials, and the facility’s compliance with sampling protocols, etc.

Specific regulations required for beneficial use of C&D materials at a facility in the Burlington, VT area will be researched and outlined within in a future report.

Continued on next page

End Markets Assessment, Continued

Composition

The average composition of C&D is difficult to estimate given the variety of materials that constitutes the waste stream. Additionally, depending on the type of job performed, the materials will vary widely. For example, demolishing a large concrete and metal industrial building will produce a waste type and quantity completely different from re-roofing a single-family residential house.

According to the Vermont Waste Composition Study, June 2002, prepared by DSM Environmental Services, Inc., a waste composition study performed at two separate facilities within the Burlington, VT region (Waste USA landfill in Coventry, and WSI Transfer Station in Burlington) provided the following C&D composition percentages:

Material	Percentage (By Volume)
Painted and Pressure Treated Wood	24%
Clean Wood	19%
Asphalt Shingles	21%
Scrap Metal	7%
Drywall	5%
All other waste categories	24%

Continued on next page

End Markets Assessment, Continued

End product assumptions

To assess the end markets for mixed C&D-derived materials, an estimate of the amounts and types of materials produced post-sorting/processing must be made, as opposed to the composition of inbound materials. Therefore, several assumptions had to be made about the quantity of material handled, and the general type of processing that would occur.

- The quantity of material accepted will assume an estimated quantity of 50 tons per day, or roughly 30% percent of the 167 tons per day handled in the Burlington, VT area as described above.
- Materials accepted at the facility will be mixed C&D materials, as opposed to source-separated loads of wood, gypsum, aggregates, asphalt shingles, etc.
- Processing will include some type of system with screening, grinding, and manual and/or mechanical separation.
- The facility will sort wood.
- The facility will screen fines.
- The facility will sort aggregates.
- The facility will sort metals.
- The facility will sort gypsum.
- The facility will sort cardboard.
- The facility will sort asphalt shingles.

Please note that GSE is not recommending that a new facility attempt to do this level of sorting, but rather is making the assumptions in order to compare the production of each end product with the end-market's capacity to handle each type of end product. From these estimates, a proposed facility could determine based on this capacity, as well as the cost to produce the end product and the cost to transport and tip the product at its final destination, whether to perform that degree of separation.

Continued on next page

End Markets Assessment, Continued

End Product Percentages Based on the assumptions above, and experiences with similar facilities, GSE estimates the following percentages and quantities of end products.

Material	Percentage*	Tons of Material Sorted**
Fines	30%	15.00
Mixed Wood (clean, painted, or engineered, but not treated wood)	25%	12.50
Aggregates	5%	2.50
Metals	5%	2.50
Gypsum	2%	1.00
Asphalt Shingles	2%	1.00
Cardboard	1%	.50
Residuals, Bulky Waste, Other Non-Recyclables	30%	15.00
Total	100%	50.00

*Percentage by weight.

**Based on assumption of 50 tons per day incoming C&D.

Continued on next page

End Markets Assessment, Continued

Fines End Markets

C&D-derived fines, or screenings from mixed C&D debris, make up a large percentage of the weight of post-processed/sorted materials. Fines are typically marketed as Alternative Daily Cover (ADC) at landfills. Based on experiences with materials produced at similar facilities, GSE would anticipate approximately 30 percent by weight of the total quantity of material would be marketed as ADC. Thus, approximately 15 tons of ADC would likely be marketed to the landfills within proximity of the Burlington, VT, area.

According to a representative of the Vermont Agency of Natural Resources (VT ANR), none of the landfills within the State of Vermont are currently permitted to accept fines as alternative daily cover. Thus, no markets currently exist that are accepting the material on an ongoing basis.

Based on VT ANR data that provided the total incoming tons of waste into the two Burlington area landfills, a total of 389,678 tons of waste was disposed within the landfills in 2003. GSE extrapolated the total quantity of daily cover likely demanded by these landfills based on an assumption of 20 percent of the total incoming waste would be required for daily covers needs at the two facilities. This would equate to a need of approximately 77,935 tons of daily cover needed on an annual basis.

To provide a conservative estimate of the amount of C&D fines that could be provided as alternative daily cover, and therefore “replace” some portion of their total daily cover needs, GSE used an estimate of 25 percent of the total daily cover needs. Based on these assumptions, approximately 312 tons total of all daily cover, and 78 tons of alternative daily cover could be used by the end markets (the two landfills), based on 250 operational days annually. Therefore, if an estimated 15 tons per day of fines was generated at a mixed C&D recycling facility in the Burlington area, the current estimated alternative daily cover needs provides an adequate quantity of capacity. However, since neither landfill is currently accepting fines as alternative daily cover, the actual amount accepted, the prices, the conditions with which they accept the material, or whether they want to accept the material, is at the discretion of the landfill owners, and conditional upon approval by VT ANR. The information on the two landfills is summarized in the table below.

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End Markets Assessment, Continued

Facility Name, Location, Owner	2003 Tons of Incoming Waste*	Estimated Annual Daily Cover Needs	Estimated Daily Cover Demand Per Day (Tons)**	Estimated Alternative Daily Cover Demand Per Day (Tons)**
Waste USA Landfill, Coventry, VT, Casella Waste Systems, Inc.	260,158	52,032	208	52
Moretown Landfill, Moretown, VT, Waste Systems International, Inc.	129,520	25,904	104	26
Totals	389,678	77,936	312	78

*Includes MSW, C&D, and "Other" waste.

**Assumes landfills require approximately 20% of incoming material for daily cover. Also assumes approximately 25% of their total daily cover needs could be from C&D fines. Based on 250 operational days per year.

Other fines outlets

According to a VT ANR representative, Waste USA Coventry Landfill currently processes C&D onsite, and uses the material for interior roadways within the footprint of the landfill. The need and use of fines material for roadways would be at the discretion of the landfill owner or operator, and therefore was not estimated for this study. However, GSE encourages the owner/operator of the proposed mixed C&D recycling facility to approach the existing landfills to market their fines for this purpose.

If CSWD develops the proposed lined landfill in Williston, VT, a tremendous cost savings could result for a Burlington-area mixed C&D recycling facility by reducing the transportation distance to the end market, providing the facility accepts fines for use as ADC.

Although not included within the study, GSE encourages the future owner/operator of the proposed mixed C&D recycling facility to approach the nearby out-of-state landfill, Clinton County Regional Landfill, in Morrisonville, NY to determine their potential needs for alternative daily cover.

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End Markets Assessment, Continued

Cost and capacity

To determine the potential cost of providing fines to landfills for alternative daily cover, and the remaining (and/or proposed) longevity of the markets, GSE surveyed the landfills. The table below provides a summary.

Facility Name, Location, Owner	Years of Remaining Capacity	Years of Proposed Expansion Capacity*	Fees Charged for Alternative Daily Cover (ADC) Materials**	ADC Material Specifications
Waste USA Landfill, Coventry, VT, Casella Waste Systems, Inc.	3.5	15-22	\$0-\$70 per ton	2 to 3-inch minus-sized materials. Dependent upon ratios of incoming waste to ADC, ratio of C&D fines to other soil product, level of contamination, organic content, particle size, quantity and consistency of supply, and gypsum content.
Moretown Landfill, Moretown, VT, Waste Systems International, Inc.	2	5-6	\$0-\$30 per ton	3-inch minus-sized materials. Dependent on level of contamination, organic content, particle size, quantity and consistency of supply, and gypsum content.
Totals	3.5	15-22		
*Based on proposed expansion plans.				
**Not currently accepting C&D as ADC. Based on fees charged for similar alternative daily cover materials such as foundry sand and paper sludge. Does not include CSWD's \$17.61 per ton tax on disposal, VT ANR's \$6.00 per ton tax on disposal, VT ANR's \$0.75 per ton permit fee tax, or other host community fees.				

Continued on next page

End Markets Assessment, Continued

Fines Issues

The following is a summary of the major issues associated with fines:

- Under certain conditions, Hydrogen Sulfide gas, which is typically characterized by a rotten egg type smell, can be produced in higher concentrations at landfills using fines for ADC if the gypsum is not removed and/or if the ADC material is not applied using best management practices.
- Strict inspection protocols and waste screening practices must be in place at mixed C&D recycling facilities in order to insure that hazardous constituents do not enter the fines ADC product.
- CSWD currently imposes a solid waste management ordinance fee on all materials disposed in landfills. In GSE's opinion, based on similar action in other states, ADC is a diversionary market, and therefore should not be subject to the CSWD's Solid Waste Management Ordinance Fee. Making the fines product subject to CSWD's fee will greatly increase the cost of mixed C&D recycling, and have a detrimental effect on the development of such a facility.
- Mixed C&D recycling facilities can increase or decrease fines production by modifying their handling/processing procedures. Whether C&D recycling facilities want to increase or decrease fines production depends upon:
 - The total amount of fines that can be accepted at the landfills (E.g. the preferred percentage of their total daily cover needs),
 - The organic content (primarily small pieces of wood) allowed within the fines,
 - The total cost to truck and tip fines at the landfill(s), and
 - The economic viability of other markets for components of the fines. In areas where no alternative markets exist, and/or where it is not cost effective to separate materials from fines, facilities will produce ADC from a majority of their incoming C&D debris, and perform little or no separation of gypsum, aggregates, or wood. These facilities essentially serve as volume reduction facilities.
- C&D fines production can be increased or decreased by:
 - Modifying the size of the screen used during sorting (3" screen versus a 1" screen), and
 - Pre-processing materials prior to screening to reduce their size (pre-grinding the material, or tracking materials with a bulldozer or excavator to crush the materials).

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End Markets Assessment, Continued

Wood Categories

Wood also makes up a large portion of mixed C&D. Wood separated from mixed C&D debris can typically be characterized by at least two categories:

1. Mixed Wood (a combination of clean, painted, treated, and engineered)
2. Clean Wood

Mixed Wood

Based on wood products derived from mixed C&D at similar facilities, a mixture of clean, painted, and engineered wood typically comprises approximately 25 percent by weight of outbound materials from facilities that separate out the wood. Thus, approximately 12.50 tons of mixed wood would be generated per day from a 50-tons per day mixed C&D recycling operation. Although the overall wood portion of mixed C&D is typically larger (comprised 43 percent of the incoming volume in the Vermont Waste Composition Study, referenced above), it can be difficult to extract smaller pieces of wood, and some wood is screened out with the fines.

GSE researched the end markets for mixed wood. Based on this research, two existing facilities can accept mixed wood materials. However, while the facilities can accept mixed wood, they require treated wood such as Creosote treated telephone poles and CCA-treated lumber to be removed. Combined, the two Boralex facilities are capable of accepting approximately 1,450 tons of mixed wood per day. Thus, an adequate market would likely exist for C&D-derived mixed wood.

Facility Name, Location, Owner	Price Paid Per Ton	Conditions
Boralex, Stratton, ME, Boralex, Inc.	\$8	3"-minus size, No treated wood
Boralex, Livermore Falls, ME, Boralex, Inc.	\$5	3"-minus size, No treated wood

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End Markets Assessment, Continued

Other mixed wood outlets

GSE contacted Greenville Steam Company, Greenville, ME. The company is currently only accepting mixed C&D wood from existing suppliers. GSE encourages the developer of a mixed C&D recycling facility in the Burlington area to contact that facility in the future to determine whether they will begin accepting additional customers.

According to a representative of VT ANR, C&D wood is being used as road base material within the footprint of the Waste USA Landfill in Coventry, VT. As with fines, GSE recommends the owner/operator of a mixed C&D recycling facility to approach the landfill for using mixed C&D wood for this purpose. However, the quantity demanded, and the condition upon which the material is accepted is at the discretion of the landfill owner/operator.

Mixed wood issues

The following is a summary of the major issues associated with mixed wood:

- Depending upon the fluctuating prices paid for wood fuel, the cost of transportation, and the prices for alternative markets (disposal, ADC, etc.), it may not justify the cost of separation, processing, and transportation.
 - Treated wood can be challenging to remove from mixed C&D.
 - Transportation in the winter months, especially in the area approaching Stratton, ME can be difficult for trucking.
 - Wood storage can require significant amounts of storage area on site when/if outlets for the material are temporarily inaccessible.
 - Depending on its use, mixed wood could be subject to the CSWD, VT ANR, and other taxes.
-

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End Markets Assessment, Continued

Clean Wood To determine the markets for separated clean wood (unpainted, untreated, non-engineered), GSE explored the most common uses including:

- Mulch
- Fuel
- Compost bulking agent

Based on wood products from similar facilities, GSE anticipates approximately 50 percent by weight of the total amount of mixed wood would likely will be clean wood product. Thus, approximately 6 tons of clean wood would be produced per day at a 50-tons per day mixed C&D recycling facility.

No fuel outlets exist within the Burlington region that currently accept wood derived from mixed C&D. The two Maine facilities listed above accept the clean wood product at the same prices as the mixed wood product, thus it wouldn't make sense to sort just the clean wood if this were the intended outlet.

Given the relatively small amount of clean wood anticipated (6 tons, or approximately 24 yards), compared to the size of the mulch market, GSE assumes an adequate market exists for clean wood chips as mulch, and did not perform exhaustive research on the retail or wholesale markets for clean wood chip mulch.

GSE interviewed Intervale Compost Products, Burlington, VT. According to Intervale, the facility currently pays approximately \$19.00 per ton for similar compost bulking agent. However, the material would have to be ground to a very fine 3/8" – 1/2" size, and would have to be completely free of any contaminants such as plastic, nails, etc. The facility has the capacity for approximately 2,000 tons per year (approximately 8 tons daily) of bulking agents, which would provide an adequate outlet for the clean wood derived from a 50 ton per day mixed C&D recycling facility.

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End Markets Assessment, Continued

Other clean wood outlets

GSE contacted McNeil Generating Station, Burlington, VT. According to McNeil, the facility is not currently allowed to take recycled wood derived from mixed C&D, and approval would be required from VT's Air Quality Division. The facility currently purchases approximately 5,000 tons per year of "clean" recycled wood consisting of pallets, spools, trees, etc., and has the capacity to purchase approximately 5,000 additional tons of similar material. The facility currently pays approximately \$15 per ton for similar wood product. 5,000 tons per year equates to roughly 20 tons per day, which would provide an adequate outlet for the clean wood generated from a 50-ton per day mixed C&D recycling facility (approximately 6 tons daily). GSE recommends contacting Vermont's Air Quality Division and McNeil for information on the permitting procedures.

Additionally, according to CSWD, the CSWD Wood Yard in Burlington, VT, CSWD accepts wood for a fee of approximately \$17.00/ton*. In situations where equipment failure or outlets are incapable of accepting materials, clean wood product could be brought to this facility for a fee.

*Based on the cost of tipping a 40 cubic yard container of clean wood waste, the estimated per ton rate is calculated as follows:

- The first 6 yards are accepted at no charge, and \$5 per yard for every yard after 6. Thus \$0 for the first 6 yards plus \$5/yard for the remaining 34 yards would result in a tipping fee of \$170 for a 40 cubic yard container of clean wood waste.
- Assuming an approximate conversion rate of 4 cubic yards per ton, a \$170 fee for 40 cubic yards equates to approximately \$17 per ton.

Clean wood chip issues

The following is a summary of the major issues associated with clean wood:

- Quality control is a significant issue with clean wood products such as fuel, compost bulking agent, or mulch.
- Chipped, sorted, clean C&D-derived wood has an overall lower value in the mulch market compared to natural bark mulch or whole tree chips.
- If a majority of the clean wood is separated from mixed wood, the fuel markets may not be willing to accept the remaining mixed wood product, since it visually looks a lot less clean, and will likely have a higher concentration of contaminants.
- Certain uses of wood derived from mixed C&D are likely subject to additional regulations from VT ANR.

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End Markets Assessment, Continued

Mixed Aggregate

Mixed Aggregate products are primarily a mixture of asphalt, brick, and concrete (ABC). The product, if sorted correctly, can be used as a substitute for fill or other aggregate material. However, given the inconsistency of the product with the varying densities, size, shape, etc., the product typically does not meet natural aggregate specifications for roadway or other construction-related projects.

Based on experiences with materials produced at similar facilities, GSE estimates approximately 3 tons of Mixed Aggregate product will likely be sorted from a 50 tons per day mixed C&D recycling operation. GSE assumes that given this relatively small quantity of aggregate, adequate markets exist for this product in non-construction (non-spec) applications, and did not perform exhaustive research on the wholesale or retail markets for the product. However, according to A. Marcelino & Company, Inc. of South Burlington, VT, a processor of mixed aggregate materials, the company sells a recycled (crushed) concrete product for \$9.00 per yard (or approximately \$6.00 per ton assuming a ratio of 1.5-tons per yard).

Mixed Aggregates Issues

The following is a summary of the major issues associated with mixed aggregate:

- The additional costs associated with manually separating mixed aggregates from mixed C&D (unless the materials enter the facility source separated) may not justify a significant amount of separation.
 - Regulations on the use of recycled mixed aggregate product, as well as the cost of additional processing, and the costs of transportation, will dictate whether the product will be marketed “as is” as a solid fill material, size reduced on-site for use as a natural aggregate substitute, or transported to a third party aggregate crushing operation.
 - The quality of the aggregate product will largely dictate its end use.
 - Stockpiling of aggregates can require a significant amount of storage area on site.
 - Depending upon the purchase price and operational costs of aggregate crushing equipment, and the amount of revenue generated (if any) from selling the end product, it may be more cost effective to have a subcontractor provide periodic on-site aggregate processing, versus owning the equipment.
 - Painted or coated aggregate product may be subject to additional regulations, and may have limited uses.
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End Markets Assessment, Continued

Gypsum End Markets

To determine the markets for separated gypsum, GSE explored the most common uses including:

- Compost bulking agent
- Recycled into new gypsum board products
- Agricultural soil amendment

Based on gypsum product sorted from other similar mixed C&D recycling facilities, gypsum typically comprises approximately 2 percent of the outgoing material. Thus, approximately 1 ton of gypsum would likely be produced from a 50-tons per day mixed C&D recycling operation. Although the overall gypsum portion of mixed C&D is typically larger, it can be difficult to extract smaller pieces of gypsum, and some gypsum is screened out with the fines product.

GSE identified one outlet for gypsum. GP Gypsum, Newington, NH currently has capacity for approximately 30 tons per day of clean gypsum. GP currently charges approximately \$12.00 per ton for gypsum delivered to their facility.* The facility accepts only clean, paper-faced gypsum wallboard. No demolition waste is acceptable, and the material must be shipped on pallets or in drop belly trailers only.

GSE was not able to identify end-markets within the Burlington area that are currently accepting and using recycled gypsum as an agricultural soil amendment.

*Price is determined by truckload volume. \$12 per ton assumes 20 tons per truckload, at a cost of \$240/load.

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End Markets Assessment, Continued

Other gypsum markets

GSE interviewed Intervale Compost Products, Burlington, VT. According to Intervale, the facility currently is not willing to accept gypsum derived from mixed C&D due to concern of possible contaminants such as adhesives and fire retardants within the product. However, the facility is interested in research that can be provided to determine the potential contaminants and how/if they affect their end products. As stated above in the clean wood section, the facility currently obtains approximately 2,000 tons per year of bulking agent (8 tons per day). If this market were to become a potential outlet, the facility would provide an adequate amount of capacity for the gypsum from a 50 tons per day mixed C&D recycling facility.

GSE contact BPB, a gypsum Manufacturer near Montreal, Quebec, Canada. According to the BPB, the facility currently only recycles in-house scraps from their manufacturing process, and does not accept from outside sources. However, the company is considering providing this service in the future.

If a mixed C&D recycler attempts to create a market for agricultural soil amendments, the facility would have to approach users of the material in the agricultural/horticultural industry and determine their specifications for acceptance. Additionally, the business would have to obtain permits from the VT ANR. This use, and several other uses are described in detail within the VT ANR's document entitled "Gypsum Wallboard Recycling and Reuse Opportunities in the State of Vermont," dated August 25, 2000.

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End Markets Assessment, Continued

Gypsum Issues The following is a summary of the major issues associated with gypsum derived from mixed C&D:

- Depending upon the fluctuating prices being paid for or paying to recycle gypsum, the cost of transportation to markets, and the prices for alternative markets (disposal, ADC, etc.), it may not justify the cost of separation, processing, and transportation.
- The additional cost of manually separating gypsum from mixed C&D (unless the facility requires source separation) may not justify separation. Gypsum is typically broken up during the loading, unloading, and sorting processes, making manual separation difficult and sometimes impractical due to the small size of the pieces of gypsum passing through a manual sorting system.
- Gypsum may need to be removed from mixed C&D in order to reduce Hydrogen Sulfide gas production at landfills intending to use fines as ADC.
- Dust suppression during processing will likely be required, and the grinding may be subject to air quality regulations. The facility will, at a minimum, need to calculate the anticipated emission (e.g. PM-10 and PM-2.5) from the facility to see if they need to apply for a state and/or federal air permit.
- Stockpiling sorted gypsum may require a significant amount of storage area on site.
- Separating the paper from gypsum to produce a higher value end product is difficult and expensive, and is typically only done with higher volume operations (>25 tons per day).
- Using large quantities of gypsum in a composting operation is not likely due to the relatively small amounts of gypsum that are needed (or desired) as bulking agent.
- Compost must be carefully managed in order to prevent the conditions that cause Hydrogen Sulfide gas production (high moisture, anaerobic conditions).
- Contract grinding of gypsum may be more cost effective. Depending upon the purchase price and operational costs of gypsum processing equipment, and the amount of revenue generated (if any) from selling the end product, it may be more cost effective to have a subcontractor provide periodic on-site processing, versus owning the equipment.

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End Markets Assessment, Continued

Asphalt Shingle End Markets To determine the markets for asphalt shingles, GSE explored the most common uses including:

- Asphalt pavement additive
- Course roadway product (with just shingles, or combined with mixed recycled aggregate)

No markets for asphalt shingles currently exist within the Burlington area. However, test programs have been completed in Vermont, and the results were favorable. Given that no markets exist, there is inadequate capacity to handle the asphalt shingles derived from a 50-tons per day mixed C&D recycling operation.

Other Asphalt Shingle Markets According to CSWD, A. Marcelino & Company, South Burlington, VT, has recently submitted permit applications for developing a new shingle recycling operation. GSE recommends that the owner/operator of the mixed C&D recycling operation contact A. Marcelino to determine their intended specifications and total processing capacity.

Several test pilots and specifications for asphalt shingle recycling are discussed in detail within a report from CSWD and VT ANR entitled, "Performance of Recycled Asphalt Shingles for Road Applications," dated September 2002.

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End Markets Assessment, Continued

Asphalt Shingle Issues

The following are some of the major issues that must be considered with recycling asphalt shingles:

- If a mixed C&D recycler were to attempt to recycle asphalt shingles, the facility would have to create their own end market. This could involve separate permitting, additional processing equipment, and ongoing sampling and testing of the incoming materials and end product manufactured.
 - Asphalt shingle recycling is typically performed on source-separate shingle materials from residential re-roofing projects, or from factory off-spec materials and scrap. The variability of asphalt shingle scrap derived from mixed C&D may impact the quality of the product, and also make sampling more difficult. The extra cost of manually separating asphalt shingles from mixed C&D (unless the facility requires source separation), may be cost prohibitive.
 - Historically, some asphalt shingles were made with asbestos components. However, the asbestos was typically used in the mastic shingle adhesive, and is typically encapsulated within the adhesive matrix, preventing the material from becoming airborne. Regardless, asphalt shingle recycling operations in other states, such as Massachusetts, are required to perform ongoing asbestos sampling on representative samples of incoming materials. If sampling frequency requirements are high, asphalt shingle recycling can become cost prohibitive.
 - Dust suppression during processing will be required, and the grinding may be subject to air quality regulations.
 - Contract grinding of asphalt shingles may be more cost effective. Depending upon the purchase price and operational costs of asphalt shingle processing equipment, and the amount of revenue generated (if any) from selling the end product, it may be more cost effective to have a subcontractor provide periodic on-site processing, versus owning the equipment.
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Conclusions and Recommendations

Introduction

Green Seal Environmental, Inc. conducted research to assist in the future development of a mixed construction and demolition (C&D) recycling facility in the Burlington, VT area. The following section provides conclusions and recommendation for the development of a mixed C&D recycling operating in the Burlington, VT area, including the following:

- C&D Generation
- Tipping Fees
- End Markets

Lastly, this section introduces the future research to be conducted as part of the overall project.

Generation

The following is a summary of C&D generation in the Burlington, VT area:

- Approximately 41,639 tons per year, or approximately 167 tons per day were handled by transfer stations and landfills in the Burlington-area in 2003. For the purpose of this assessment, GSE will assume that the same amount of C&D will be generated in 2004.
 - A majority of the total C&D handled (99%, or 164 tons per day) is handled by two local transfer stations. Very little C&D is direct-hauled to in-state landfills due to the distance relative to the in-town transfer stations.
 - If a new C&D recycling facility were to offer significant incentives (disposal price, transportation price, ease of use, recycling promotion, proximity to central generation points, etc.) in an effort obtain a 30 percent market share of the 167 tons per day handled in the Burlington, VT area, it would equate to approximately 50 tons per day. GSE will use this assumption for comparisons to end-market capacity of post-processed materials.
-

Tipping Fees

The following is a summary of the tipping fees assessment performed for the Burlington, VT area:

- C&D is primarily handled by 3 facilities (two transfer stations and one landfill), with a weighted average tipping fee of \$96.48 per ton.
 - To provide a conservative estimate, GSE recommends a reduction in tipping fees by 25 percent if a facility were to attempt to obtain 30 percent (50 tons) of the total C&D generated per day (164 tons). With a 25 percent reduction in tipping fees, the price would be approximately \$72.00 per ton, generate approximately \$3,600 in tipping fees daily based on 50 tons.
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Conclusions and Recommendations, Continued

End Markets

The following is a summary of the end markets for mixed-C&D derived products including: Fines, Mixed Wood, Clean Wood, Gypsum, Aggregates, and Asphalt Shingles:

- No landfills in the Burlington area are currently accepting or permitted to accept C&D fines as alternative daily cover. The proponent of a mixed C&D recycling facility within the Burlington area should take steps to obtain tentative commitments from landfills to accept fines, and should immediately take steps to obtain permits for the material. If fines cannot be used as alternative daily cover, this will have a detrimental effect on the development of a mixed C&D recycling operation.
- In GSE's opinion, fines used for ADC should not be subject to disposal taxes since they are diversionary markets. If fines are subject to the CSWD and VT ANR disposal taxes, this will have a detrimental effect on the development of a mixed C&D recycling operation. According to CSWD, this is a policy that the Board will consider.
- Waste USA Landfill uses ground mixed C&D for roadways within the footprint of the landfill. This market should be further explored.
- Adequate end-markets exist for mixed wood derived from C&D, however, the markets are very distant (Northern Maine). Trucking, separation, processing costs, and other factors need to be considered to determine whether it justifies separating wood from mixed C&D.
- Adequate markets exist for clean wood as compost bulking agent and/or wood chip mulch. No markets currently exist for C&D-derived clean wood for fuel. GSE recommends that the developer of a mixed C&D recycling facility begin the process of obtaining commitments from McNeil Generating Station to accept the clean wood, and GSE recommends contacting Vermont's Air Quality Division and McNeil for information on the permitting procedures.
- Adequate markets exist for recycling clean gypsum, however, the markets are very distant (Southern New Hampshire). Trucking, separation, processing costs, and other factors need to be considered to determine whether it justifies separating gypsum from mixed C&D.
- Adequate markets likely exist for recycling clean aggregate. The cost of separation and further processing (to produce a uniform product for resale) need to be considered to determine whether to ship the raw recycled material to an end market, purchase processing equipment for on-site processing, or obtain the services of a contract processor to periodically process on site.

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Conclusions and Recommendations, Continued

End Markets (continued)

- No markets currently exist for recycling asphalt shingles. Asphalt shingles are not typically sorted from a mixed stream of C&D, but rather from source-separated loads of material. Trucking, separation, processing costs, and other factors need to be considered to determine whether it justifies separating gypsum from mixed C&D.
 - If a mixed C&D recycler were to attempt to recycle asphalt shingles, the facility would have to create their own end market. This could involve separate permitting, additional processing equipment, and ongoing sampling and testing of the incoming materials and end product manufactured.
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Future research

The information prepared within this document will be used for future research to be conducted by GSE, including:

- Processing line and mobile equipment selection research,
 - Draft “generic” site layout design sketch,
 - Preparation of permitting requirements,
 - Summary business plan development, and
 - Preparation of a C&D facility development package
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Permit Outline

Introduction

The following document was prepared by Green Seal Environmental, Inc. to outline the permitting process for siting a mixed construction and demolition (C&D) debris recycling facility in the Burlington, VT area. This document presents general permits for Federal, State, Regional, and Local permitting and/or approvals. This document presents a general outline and does not provide comprehensive permitting requirements. Prior to facility development, the proponent must determine all permits and/or approvals that may be required, including those that may be municipal and/or site-specific.

Federal permits

The following Federal permits may be required for the development of a mixed C&D recycling facility:

- US Fish and Wildlife Service (depends on endangered species on or near the site)
- Clean Water Act – Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (depends on proximity to wetlands and/or stormwater discharges)
- Clean Air Act Air Permits (depends on emissions from stationary and/or mobile equipment)
- National Pollutant Discharge Elimination System (NPDES) Construction General Permit (depends on proximity and/or potential discharges to Water Bodies of the US during construction activities)
- National Pollutant Discharge Elimination System (NPDES) Multi Sector General Permit (depends on proximity and/or potential discharges to Water Bodies of the US during operations)
- Spill Prevention Control and Countermeasures (SPCC) Plan (depends on the storage amount of oil or hazardous materials on site such as bulk fuel storage)

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State permits

The following State of Vermont permits and/or approvals may be required for the development of a mixed C&D recycling facility:

- Solid Waste Management Facility Certification – Storage, Transfer and Recycling Facility Certification – Vermont Agency of Natural Resources, Department of Environmental Conservation, Solid Waste Management Program (Vermont Solid Waste Management Rules, 10 Vermont Statutes Annotated, Chapter 159, Waste Management, Subchapter 12 – Storage, Transfer and Recycling Facilities – commonly referred to as “Act 78”).
- Vermont Environmental Board – Waste Facility Panel, District 4 – Chittenden County (Title 10 Vermont Statutes Annotated, Chapter 151 – commonly referred to as “Act 250”).
- Approval of Alternative Daily Cover at Landfills – Vermont Agency of Natural Resources, Department of Environmental Conservation, Solid Waste Management Program (application required from the landfill, but will likely have to be prepared by the recycling facility owner/operator).
- Request for Acceptable Use of Solid Wastes – Vermont Agency of Natural Resources, Department of Environmental Conservation, Solid Waste Management Program (may be required for beneficial use of C&D-derived materials)
- Vermont Pretreatment Discharge Permit – Vermont Agency of Natural Resources, Department of Environmental Conservation, Water Quality Division (may be required for disposal of tipping floor drainage wastewater).
- Water Quality Certification, Vermont Water Resources Board – Water Quality Standards (depends on whether any activities will result in a discharge to a Water Body of the US)
- State of Vermont Agency of Natural Resources, Department of Environmental Conservation, General Permit 3-9015, New Stormwater Discharges to Waters That are Not Principally Impaired by Collected Stormwater Runoff (depends on the potential for stormwater discharges)
- Conditional Use Determination – Vermont Wetland Rules, Vermont Agency of Natural Resources, Department of Environmental Conservation, Water Quality Division (Title 10 Vermont Statutes Annotated, Chapter 37 – may be necessary depending upon proximity to “significant” wetlands or buffer zones)
- State of Vermont Agency of Natural Resources, Department of Environmental Conservation, Air Pollution Control Division, Permit to construct or modify, and permit to operate a stationary source of air contaminants (Primarily related to the potential quantity of Particulate Matter (PM) produced during processing, and whether internal combustion engines are used versus electrical).

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Regional permits

The following Regional permits and/or approvals may be required for the development of a mixed C&D recycling facility:

- Compliance with Planning Requirements – Solid Waste Management District, Chittenden Solid Waste District (CSWD). Per the requirements of 24 V.S.A., Chapter 61, 2202a, an applicant must submit evidence that the facility is included in a solid waste implementation plan adopted by a solid waste district. This requires a written request from the proponents of the facility to CSWD, asking to be listed within their solid waste implementation plan. A copy of the proposed facility’s VT ANR application must also be sent to CSWD. CSWD’s board then makes a determination, and sends a letter to ANR stating whether they are included within the regional plan.
 - Regional Planning Commission (Chittenden County Regional Planning Commission - CCRPC), 24 V.S.A., Chapter 61, 117. The CSWD implementation plan adopted pursuant to 24 V.S.A. § 2202a must also be in conformance with the regional plan created by Chittenden Regional Planning Commission (CCRPC). Therefore, a solid waste facility attempting to obtain permits should confirm that their inclusion within the CSWD regional plan is also consistent with the CCRPC regional plan.
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Local permits

The following local approvals may be required for the development of a mixed C&D recycling facility:

- Planning/Zoning/Development Review Board Approvals (Special Use Permit, Site Plan Review - depends on local zoning/planning regulations)
 - Wetland Filings (depends upon proximity to wetlands or buffer zones, and whether authority is state or local for regulating activities)
 - Water, Wastewater permits (depends on whether there is on-site or offsite management of wastewater)
 - Building Permit (from Building Department or similar agency or individual of authority)
 - Certificate of Occupancy (from Building Department or similar agency or individual of authority)
 - Fire Department (depends on fire suppression system needs, and/or aboveground or underground storage of oil or hazardous materials, such as bulk fuel)
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Permitting timelines

The following table identifies applicable major permits and the approximate timelines for review. GSE omitted permits that are site-specific such as wetlands permits. The following timelines do not include estimated application preparation time. Additionally, timelines are based on sequential submittal versus simultaneous submittal of permit applications. Preparing and/or submitting permit applications simultaneously with other applications may shorten the total time it takes to obtain the permits. Given that timelines for local permits are subject to many variables that are both site-specific and specific to each municipality's authority, GSE provided conservative estimates.

Permit Name	Permit/Approval Granting Authority	Approximate Review/ Approval Timeline*
CSWD compliance with Solid Waste District Plan	CSWD	60 days
State Solid Waste Management Facility Certification (Act 78 Permit)	VT ANR	120 Days (210 days with a hearing)
Alternative Daily Cover Approval	VT ANR	90-120 days
Land Use Permit (Act 250 Permit)	VT Environmental Board (District 4 –Essex Junction)	60-80 days
Zoning/Planning	Municipality	90-180 days
Building /Occupancy	Municipality	90-180 days
Total = 510 - 830 days (17-28 months)		

Note: Timelines are estimated

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Timeline variables

Variables which may increase or decrease review and/or approval timelines include but are not limited to:

- the completeness and accuracy of submittals,
 - compatibility of the proposed location with siting criteria,
 - compatibility with state and regional solid waste planning,
 - public meeting schedules,
 - legal challenges or appeals,
 - site-specific environmental issues,
 - proposed design and/or operational standards, and
 - other unforeseen issues or events.
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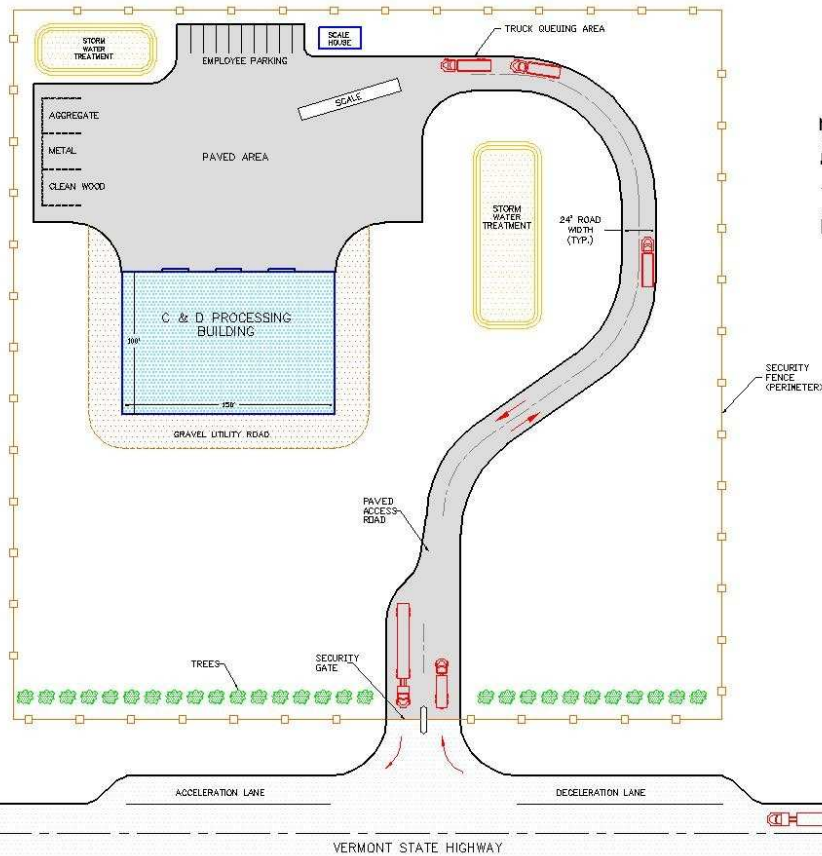
Conclusions

Permits and approvals are required at the Federal, State, Regional, and Municipal levels for the development of a construction and demolition debris recycling facility within the Burlington area. This document summarized the major permits required to assist in the development of such a facility. However, prior to facility development, the proponent must determine all permits and/or approvals that may be required, including those that may be municipal and/or site-specific.

Based on the estimated review and/or approval times of the required permits, the process would take approximately 17 to 28 months following a sequential permitting approach. However, time frames can be reduced with simultaneous submittal of permit applications where possible.


SITING RESTRICTIONS

- * Green Mountain National Forest
- * Floodways and 100 Year Floodplain
- * Public drinking water supply source protected areas
- * Groundwater Class I and II
- * National Wildlife Refuges
- * Threatened or Endangered Species Habitat
- * Wildlife Management Areas
- * A watershed for Class A and Class B Water
- * Outstanding Resource Waters (500 ft.)
- * Minimum distance to property line from waste management boundary (50 ft.)
- * Minimum vertical separation from bedrock and high seasonal water table.
- * Minimum distance to waters from the waste management boundary including Wetlands Class I (100 ft.), Class II (50 ft.), and Class III (not within).
- * Minimum distance from waste management boundary to drinking water source not owned by the applicant (100 ft.)
- * Minimum distance from waste management boundary to residences, schools, day care facilities, hospitals and/or nursing homes not owned by applicant (100 ft.)




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Sample C & D Recycling Facility
Site Layout

SCALE: 1" = 100 ft.


CHECKED BY:	J.B.
DATE:	03/22/05
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